



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,607	07/18/2003	Xiaochun Linda Chen	QIM 2003 P 50508 US	4285
48154	7590	03/17/2008	EXAMINER	
SLATER & MATSIL LLP 17950 PRESTON ROAD SUITE 1000 DALLAS, TX 75252			SUCH, MATTHEW W	
			ART UNIT	PAPER NUMBER
			2891	
			MAIL DATE	DELIVERY MODE
			03/17/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/622,607	Applicant(s) CHEN ET AL.	
	Examiner Matthew W. Such	Art Unit 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-1114 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-11, 14 and 34-38 is/are allowed.
- 6) ☒ Claim(s) 1-6, 26-28 and 30-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2007 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 26 November 2007 has been entered.

Specification

2. The amendment to the specification filed 26 November 2007 is acceptable.

Drawings

3. The drawings were received on 26 November 2007. These drawings are not acceptable. Figures 4D and 4E show that Element 208 has been removed (patterned) from atop of the ring of Element 206. This directly contradicts the specification which explicitly states that "the ring of resist is of sufficient thickness that a region of the further layer of resist that is atop the ring of resist is not patterned" (see Page 3, Lines 31-34 in Paragraph 0011 and Claims 7 and 35).

4. The drawings (Figure 4) remain objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "further layer of resist that is atop the ring of resist is not patterned" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claim 7 is objected to because of the following informalities: the limitation "the top surface" in Line 7 of the claim. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

6. Claim 9 is objected to because of the following informalities: the limitation "patterned further layer of resist" in Line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The phrase "and wherein the organic material is not present on a bottom surface of the wafer" is not described in the Applicant's originally filed disclosure. The mere absence of a positive recitation is not basis for an exclusion of claimed subject matter. See MPEP § 2173.05(i).

9. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The phrase "wherein no devices are formed in the periphery region" is not described in the Applicant's originally filed disclosure. The mere absence of a positive recitation is not basis for an exclusion of claimed subject matter. See MPEP § 2173.05(i).

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "wherein no devices are formed in the periphery region" renders the claim indefinite because the claim does not define what is considered "devices". Therefore, since anything can be considered "devices" it is impossible to have "no devices" because "no devices" would mean the absence of everything. Furthermore, the phrase "a bottom surface of the wafer" renders the claim indefinite because it is unclear what comprises "a bottom surface of the wafer" particularly in relationship to "a top surface" of the wafer. For example, the wafer can be held in such a fashion with the normal direction of the resist covered surface running parallel to the surface of the Earth making that surface both a "top surface" (portion closer to the sky) and a "bottom surface" (portion closer to the ground).

12. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "without a lithographic step" renders the claim indefinite because the claim does not define what is considered "a lithographic step". Any method by which any arbitrary pattern is formed, is "lithography", meaning that in order for the layer to even exist, it had undergone some form of lithography. Therefore, since anything can be considered "a

Art Unit: 2891

lithographic step" it is impossible to have a process "without a lithographic step" because "without a lithographic step" would mean the absence of everything and also would mean the non-existence of the layer. Furthermore, the phrase "a bottom surface of the wafer" renders the claim indefinite because it is unclear what comprises "a bottom surface of the wafer" particularly in relationship to "a top surface" of the wafer. For example, the wafer can be held in such a fashion with the normal direction of the resist covered surface running parallel to the surface of the Earth making that surface both a "top surface" (portion closer to the sky) and a "bottom surface" (portion closer to the ground).

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. In so far as definite, claims 26, 28, 30 and 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Holscher ('076).

15. Regarding claims 26, 30 and 32, Holscher teaches a method of forming providing a silicon wafer (Element 12; Col. 3, Lines 7-19) that includes a top surface (see "front" Element 14 side) that includes a periphery region on the top surface of the wafer (area of top covered by Element 14) that surrounds an inner device region (between Element 14) on the top surface of

Art Unit: 2891

the wafer. A ring of resist material (Element 20 patterned) is formed over the top surface of the wafer to separate the periphery region from the device region (as discussed above the “periphery” and “device region” are defined). A plurality of devices (i.e. exposed regions of substrate or Element 13), are formed in the device region at the top surface of the wafer. There are "no devices" formed in the periphery since it is covered by a protective pad layer during device fabrication. The Examiner notes that no shape can be formed on a substrate "without lithography". The Examiner also notes that the resist layer is not on a "bottom" surface (surface of Holscher opposite the "top surface") of the wafer.

16. Regarding claim 28, Holscher further teaches that the forming step comprises depositing material in a region between the periphery of the wafer and a region between the periphery and the inner device region. Since the claim does not define characteristics which distinguishes “the periphery” from “a region between the periphery and the inner device region”, any arbitrary area can be interpreted as such since inner device region is defined (Element 14).

17. Regarding claim 33, Holscher teaches that the plurality of devices formed in the front inner device region of the wafer are formed by lithography (Figures 5 and 9, for example). Holscher teaches that a resist (Element 20) is deposited over the area for lithography to be formed, covering the inner device region and ring of material (Fig. 4, for example). The resist is patterned by deep trench lithographic etching (Figure 5) and the wafer is "altered" in alignment with the patterned layer of resist.

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. In so far as definite, claims 1, 3-6 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holscher ('076) in view of Wolf (Silicon Processing for VSLI; supplied to Applicant with Office Action dated 38 March 2007).

20. Regarding claims 1 and 6, Holscher teaches a method of forming providing a silicon wafer (Element 12; Col. 3, Lines 7-19) that includes a top surface (see "front" Element 14 side that includes a periphery region on the top surface of the wafer (area of Element 14) that surrounds an inner device region (area between Element 14) on the top surface of the wafer. A ring of resist material (Element 20) is formed over the top surface of the wafer to separate the periphery region from the device region (as discussed above the "periphery" and "device region" are defined). A plurality of devices (i.e. exposed regions of substrate or Element 13), are formed in the device region at the top surface of the wafer. There are "no devices" formed in the periphery since it is covered by a protective pad layer during device fabrication. The Examiner notes that no shape can be formed on a substrate "without lithography". The Examiner also notes that the resist layer is not on a "bottom" surface (surface of Holscher opposite the "top

Art Unit: 2891

surface") of the wafer. Holscher does not explicitly teach that the ring of material comprises an organic material, but does teach that the material is a conventional resist (Col. 3, Lines 38-40).

Wolf teaches that conventional resist materials are organic materials (pages 418-423). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an organic material as the resist material forming the ring of material since organics are highly conventional resist materials. It has been held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

21. Regarding claim 3, Holscher further teaches that the forming the ring of organic material step (organic resist, as taught by Wolf as shown above) comprises depositing material in a region between the periphery of the wafer and a region between the periphery and the inner device region. Since the claim does not define characteristics which distinguishes "the periphery" from "a region between the periphery and the inner device region", any arbitrary area can be interpreted as such since inner device region is defined (Element 14).

22. Regarding claim 4, Holscher further teaches that the forming step comprises depositing organic material atop all of the substrate and patterning the organic material to form the ring of organic material (Figs. 4-5).

Art Unit: 2891

23. Regarding claim 5, Holscher further teaches that a resist layer (Element 20, since the claim, as written, does not limit what type of material a resist is) prior to forming the ring of organic (organic resist, as taught by Wolf as shown above) material (Figs. 4-5, and associated description, for example).

24. Regarding claim 31, Holscher does not explicitly teach that the ring of material comprises an organic material, but does teach that the material is a conventional resist (Col. 3, Lines 38-40).

Wolf teaches that conventional resist materials are organic materials (pages 418-423). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an organic material as the resist material forming the ring of material since organics are highly conventional resist materials. It has been held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

25. In so far as definite, claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holscher ('076) in view of Nakayama ('315).

Holscher does not teach using a hard mask over the wafer and hence the ring of resist formed over a hard mask.

Nakayama teaches a method of forming resist over a hardmask over a wafer (Col. 11, Lines 4-12, for example). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a hardmask over the wafer and under the ring of resist, as is

Art Unit: 2891

conventional. One would have been motivated to do so in order to passivate the silicon wafer, use the hard mask as a pattern formation for etching the wafer, and prevent defects in the wafer (Nakayama Col. 11, Lines 4-12, for example).

26. In so far as definite, claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holscher ('076) in view of Wolf (Silicon Processing for VSLI; supplied to Applicant with Office Action dated 38 March 2007) as applied to claim 1 above, and in view of Nakayama ('315).

Holscher in view of Wolf does not teach using a hard mask over the wafer and hence the ring of resist formed over a hard mask.

Nakayama teaches a method of forming resist over a hardmask over a wafer (Col. 11, Lines 4-12, for example). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a hardmask over the wafer and under the ring of resist, as is conventional. One would have been motivated to do so in order to passivate the silicon wafer, use the hard mask as a pattern formation for etching the wafer, and prevent defects in the wafer (Nakayama Col. 11, Lines 4-12, for example).

Allowable Subject Matter

27. Claims 7-11, 14 and 34-38 are allowed.

28. The following is an examiner's statement of reasons for allowance:

- a. Regarding claim 34, a search of the prior art does not disclose or reasonably suggest a method disclosing the combination of limitations claimed. Specifically, the oxide/nitride/hardmask configuration with a patterned resist layer forming a ring of resist and depositing a further layer of resist atop the ring of resist; further including patterning the further layer of resist, etching the hardmask with the patterned resist layers, removing the further layer of resist, and etching a trench with the ring of resist remaining after the trench is etched.
- b. Regarding claim 7, a search of the prior art does not disclose or reasonably suggest a method disclosing the combination of limitations claimed. Specifically, forming a positive resist on a substrate and patterning the positive resist to form a ring, then after removing the patterned resist another resist layer is formed on the substrate and on the positive resist remaining and exposing the other resist within the ring to form a patterned region, leaving the other resist on the ring of positive resist unpatterned.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

29. Since claim 7 is allowable, the restriction requirement between species I and II, as set forth in the Office action mailed on 22 May 2006, has been reconsidered in view of the allowability of claims to the elected invention pursuant to MPEP § 821.04(a). **The restriction**

Art Unit: 2891

requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim. Claims 9 and 10, directed to the withdrawn species, are no longer withdrawn from consideration because the claim(s) requires all the limitations of the allowable claim 7.

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Contact Information

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew W. Such whose telephone number is (571) 272-8895. The examiner can normally be reached on Monday - Friday 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley W. Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew W. Such
Examiner
Art Unit 2891

MWS
3/6/08

***/BRADLEY W BAUMEISTER/
Supervisory Patent Examiner, Art Unit 2891***